1.   This office action is in response to the communication filed on 10/28/2003 and

the interview on 01/15/09 and 01/16/09.

2.   Claims 1-38 are allowable over the prior art of record.

3.   An Examiner's Amendment to the record appears below. Should the changes

and/or additions be unacceptable to applicant, an amendment may be filed as provided

by 37 C.F.R. § 1.312. To ensure consideration of such an amendment, it **MUST** be

submitted no later than the payment of the Issue Fee.

EXAMINER'S AMENDMENT:

IN THE SPECIFICATION:

CROSS-REFERENCE TO RELATED APPLICATIONS

    Please replace the cross-reference to related applications in the application with the

    one in the **ATTACHMENT:**

IN THE CLAIMS:

    Please replace all prior versions of claims in the application with the current listing

    claims in the **ATTACHMENT:**

4.   Authorization for this Examiner's Amendment was given in a telephone interview

with Mr. Leland Wiesner [Reg. No. 39,424] on 01/15/2009 and 01/16/2009.

The following is an Examiner's Statement of Reasons for Allowance:

The prior arts of records do not teach nor suggest a method/system for managing

time-out events in a storage area network having **all** the limitations of claims 1, 10, 14,

21, 27, 31, 36-38 in particular:

- inserting the time out event for the event in the identified time slot grouped

together with other time out events corresponding to other events in response to the

determination [claims 1, 21, and 36].

- removing the time out event for the event in the identified time slot while any

other time out events and other corresponding events grouped together in the identified

time slot continue being monitored [claims 10, 14, 27, 31, 37 and 38].

Any comments considered necessary by applicant must be submitted no later

than the payment of the Issue Fee and, to avoid processing delays, should preferably

accompany the Issue Fee. Such submissions should be clearly labeled "Comments on

Statement of Reasons for Allowance."

5.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Dieu-Minh Le whose telephone number is (571) 272-

3660. The examiner can normally be reached on Monday - Thursday from 8:30 AM to

6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Scott Baderman can be reached on (571)272-3644. The Tech Center 2100 phone number is (571) 272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/DIEU-MINH THAI LE/
DIEU-MINH THAI LE
PRIMARY EXAMINER
ART UNIT 2114

DML.
01/16/2009

ATTACHMENT:

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Application No. 60/422,109, filed October 28, 2002 and titled **"Apparatus and Method for Enhancing Storage Processing in a Network-Based Storage Virtualization System"**, which is incorporated herein by reference. This application also relates to the subject matter disclosed in the co-pending U.S. application Ser. No. 10/695,887 ~~AAAAAAAA (attorney docket 00121-000600000,~~ by Richard Meyer, et al., titled **"Method and System for Dynamic Expansion and Contraction of Nodes in a Storage Area Network"**, co-pending U.S. application Ser. No. 10/695,889 ~~BBBBBBBB (attorney docket 00121-0007000000,~~ by Gautam Ghose, et al., titled **"Failure Analysis Method and System for Storage Area Networks"**, ~~co-pending U.S. application Ser. No. CCCCCCCC (attorney docket 00121-0008000000, by Tuan Nguyen, et al., titled "Method and System for Managing Time-Out Events in a Storage Area Network",~~ co-pending U.S. Patent No. 7,080,229 ~~application Ser. No. DDDDDDDD (attorney docket 00121-0009000000,~~ by Rush Manbert, et al., **titled "Method and System for Strategy Driven Provisioning of Storage in a Storage Area Network"**, filed concurrently herewith.

LISTING OF CLAIMS:

1. (Currently amended) A method of entering a time out interval for an event in a storage area network, comprising:

identifying a time slot in a sequence of time slots to insert a time out event for the event in the storage area network;

determining if other events in the storage network already have corresponding other time out events in the time slot; and

inserting the time out event for the event in the identified time slot ~~along~~ grouped together with ~~the~~ other time out events corresponding to ~~the~~ other events in response to the determination.

2.   The method of claim 1 wherein identifying the time slot for the time out event, further comprises:

determining a time interval between each time slot in the sequence of time slots; and

selecting the time slot at an offset in the sequence of time slots based upon a multiple of the time intervals and the corresponding time out interval.

3.   The method of claim 1 wherein the time interval between each time slot is proportional to a hardware timer clock frequency.

4.   The method of claim 1 wherein the sequence of time slots to insert a time out event is implemented using a singly linked circular queue data structure.

5.   The method of claim 4 further including identifying a current time slot in the sequence of time slots using a top of queue identifier.

6.   The method of claim 5 further comprising:

moving to a subsequent time slot by advancing the top of queue identifier to a subsequent entry in the singly linked circular queue data structure each time a time interval corresponding to the time between each time slot elapses.

7.   The method of claim 1 wherein the inserting further comprises organizing the time out event for the event along with the other time out events for the other events in the identified time slot in order of insertion using a doubly linked circular queue data structure.

8.   The method of claim 7 wherein determining if other time out events are in the same time slot further comprises traversing the doubly linked circular queue associated with the time slot and attributing each entry in the doubly linked circular queue with at least one other time out event being monitored on the storage area network.

9.   The method of claim 8 wherein an empty doubly linked circular queue associated with the time slot indicates that no other time out events in the storage area network are being monitored during that time slot.

10.   (Currently amended) A method of removing a time out event being monitored for an event in a storage area network, comprising:

receiving a request to remove the time out event corresponding to an event in the storage area network;

identifying a time slot in a sequence of time slots to remove the time out event for the event in the storage area network; and

removing the time out event for the event in the identified time slot while the any other time out events and the other corresponding events grouped together in the identified time slot continue being monitored.

11.   The method of claim 10 wherein identifying the time slot for the time out event, further comprises:

receiving a time out event indicator corresponding to the selected time slot in the sequence of time slots and time out event originally selected based upon information stored in an event context.

12.   The method of claim 10 wherein the sequence of time slots to insert a time out event is implemented using a singly linked circular queue data structure.

13.   The method of claim 12 further including identifying a current time slot in the sequence of time slots using a top of queue identifier.

14.   (Currently amended) A method of monitoring time out intervals for events in a storage area network comprising:

receiving a request to determine if one or more events in the storage area network have timed out;

identifying a set of events associated with a current time slot in a sequence of time slots;

determining if the identified set of events in the current time slot is empty;

removing one or more events from the identified set of events ~~associated with the~~ grouped together in the current time slot in response to the determination; and

notifying a time-out handler associated with each of the one more events removed from the time slot to perform appropriate time-out related processing.

15.   The method of claim 14 wherein the received request occurs in response to the elapse of a time interval.

16.   The method of claim 15 wherein the time interval is proportional to a hardware timer clock frequency.

17.   The method of claim 14 wherein the current time slot in the sequence of time slots is identified using a top of queue identifier that advances to a subsequent time slot each time a time interval elapses.

18.   The method of claim 14 wherein the set of events associated with a current time slot in a sequence of time slots is implemented using a singly linked circular queue data structure.

19.   The method of claim 14 further including identifying a current time slot in the sequence of time slots using a top of queue identifier.

20.   The method of claim 14 wherein removing the one or more events from the identified set of events further comprises traversing a doubly linked circular queue associated with the time slot and removing each event entry in the doubly linked circular queue due to the expiration of the time out interval for each event entry.

21. (Currently amended) An apparatus of entering a time out interval for an event in a storage area network, comprising:

a processor ~~capable of executing~~ that executes instructions;

a memory containing instructions when executed on the processor that identify a time slot in a sequence of time slots to insert a time out event for the event in the storage area network, determine if other events in the storage network already have corresponding other time out events in the time slot and insert the time out event for the event in the identified time slot ~~along~~ grouped together with ~~the~~ other time out events corresponding to ~~the~~ other events in

response to the determination.

22.   The apparatus of claim 21 wherein the instructions that identify the time slot for the time out event, further comprise instructions that determine a time interval between each time slot in the sequence of time slots and select the time slot at an offset in the sequence of time slots based upon a multiple of the time intervals and the corresponding time out interval.

24. 23.   (Currently amended) The apparatus of claim 21 wherein the sequence of time slots to insert a time out event is implemented using instructions that operate on a singly linked circular queue data structure.

25. 24. (Currently amended) The apparatus of claim 23 further including instructions that identify a current time slot in the sequence of time slots using a top of queue identifier.

26. 25. (Currently amended) The apparatus of claim 25 24 further comprising instructions that move to a subsequent time slot by advancing the top of queue identifier to a subsequent entry in the singly linked circular queue data structure each time a time interval corresponding to the time between each time slot elapses.

27. 26. (Currently amended) The apparatus of claim 21 wherein the insert instructions further comprises instructions that organize the time out event for the event along with the other time out events for the other events in the identified time slot in order of insertion using a doubly linked circular queue data structure.

28. 27. (Currently amended).   An apparatus for removing a time out event being monitored for an event in a storage area network, comprising:
        a processor capable of executing that executes instructions;

a memory containing instructions when executed on the processor receive a request to remove the time out event corresponding to an event in the storage area network, identify a time slot in a sequence of time slots to remove the time out event for the event in the storage area network and remove the time out event for the event in the identified time slot while ~~the~~ any other time out events and ~~the~~ other corresponding events grouped together in the identified time slot continue being monitored.

~~29.~~ 28. (Currently amended).   The apparatus of claim ~~28~~ 27 wherein the instructions that identify the time slot for the time out event, further comprise instructions that receive a time out event indicator corresponding to the selected time slot in the sequence of time slots and time out event originally selected based upon information stored in an event context.

~~30.~~ 29. (Currently amended).   The apparatus of claim ~~28~~ 27 wherein the instructions that use the sequence of time slots to insert a time out event is implemented with instructions that operate using a singly linked circular queue data structure.

~~31.~~ 30. (Currently amended).   The apparatus of claim ~~30~~ 29 further including instructions that identify a current time slot in the sequence of time slots using a top of queue identifier.

~~32.~~ 31. (Currently amended).   An apparatus for monitoring time out intervals for events in a storage area network comprising:
          a processor ~~capable of executing~~ that executes instructions;
           a memory containing instructions when executed on the processor receive a request to determine if one or more events in the storage area network have timed out, identify a set of events associated with a current time slot in a sequence of time slots, determine if the identified set of events in the current time

slot is empty, remove one or more events from the identified set of events
~~associated with the~~ grouped together in the current time slot in response to the
determination and notify a time-out handler associated with each of the one more
events removed from the time slot to perform appropriate time-out related
processing.

33. 32. (Currently amended).   The apparatus of claim 32 31 wherein
the instructions receive the request in response to the elapse of a time interval.

34. 33. (Currently amended).   The apparatus of claim 32 31 wherein
the instruction that identifies the current time slot in the sequence of time slots
uses a top of queue identifier that advances to a subsequent time slot each time
a time interval elapses.

35. 34. (Currently amended).   The apparatus of claim 32 31 wherein
the set of events associated with a current time slot in a sequence of time slots is
implemented using instructions that operate on a singly linked circular queue
data structure.

36. 35. (Currently amended).   The apparatus of claim 32 31 wherein
the instructions that remove the one or more events from the identified set of
events further comprises instructions that traverse a doubly linked circular queue
associated with the time slot and removing each event entry in the doubly linked
circular queue due to the expiration of the time out interval for each event entry.

37. 36. (Currently amended) An apparatus for entering a time out interval
for an event in a storage area network for processing on a processor, comprising:
        means for identifying a time slot in a sequence of time slots to insert a
time out event for the event in the storage area network;

means for determining if other events in the storage network already have
corresponding other time out events in the time slot; and

means for inserting the time out event for the event in the identified time
slot along grouped together with the other time out events corresponding to the
other events in response to the determination.

38. 37. (Currently amended).   An apparatus for removing a time out
event being monitored for an event in a storage area network for processing on a
processor, comprising:

means for receiving a request to remove the time out event corresponding
to an event in the storage area network;

means for identifying a time slot in a sequence of time slots to remove the
time out event for the event in the storage area network; and

means for removing the time out event for the event in the identified time
slot while the any other time out events and the other corresponding events
grouped together in the identified time slot continue being monitored.

39. 38. (Currently amended).   An apparatus for monitoring time out
intervals for events in a storage area network for processing on a processor,
comprising:

means for receiving a request to determine if one or more events in the
storage area network have timed out;

means for identifying a set of events associated with a current time slot in
a sequence of time slots;

means for determining if the identified set of events in the current time slot

is empty;

means for removing one or more events from the identified set of events
~~associated with the~~ <u>grouped together in the</u> current time slot in response to the
determination; and

means for notifying a time-out handler associated with each of the one
more events removed from the time slot to perform appropriate time-out related
processing.